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The power paradigm in practice: A critical review of developments in the Zambian electricity sector

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ABSTRACT

Sub-Saharan Africa lags behind the rest of the world in electricity access and consumption. Infrastructure deficiencies are framed in terms of a “financing gap”, with policy oriented around attracting global private capital. Recent calls for increased private infrastructure investment follow three decades of market-oriented sector reforms. This paper explores the way that this standard policy paradigm has unfolded in Zambia. Drawing on the Systems of Provision approach we focus on three core interconnected segments of the electricity system: the performance of the state utility, Zesco; private sector participation and cost-recovery pricing. The paper shows that Zesco has run into major difficulties since 2015 due to a crisis in hydro resources and adverse currency movements. In line with the policy paradigm, the utility has signed up to a number of agreements with international independent power producers (IPPs) to diversify power sources, and tariffs have been raised to improve Zesco's financial situation. However, closer inspection reveals contradictions, biases and inconsistencies in this standard policy package when applied in practice. Zesco's acutely debilitating financial position is a relatively recent occurrence. Short-term fluctuations in hydro power, for which intermittent back-up is needed, have instead been addressed with new decades-long contracts for fossil fuel generation. IPPs have provided generous returns for foreign investors but have created long-term, dollar-denominated liabilities for Zesco, contributing to a weakening financial position. Tariffs have been raised but households cannot afford to pay a price that covers Zesco's increased costs. The proliferation of IPPs appears to have worsened the situation. The paper shows that energy sector policies organised around the entry of private capital are problematic and likely to contribute to a dynamic of unequal global capital accumulation. Greater attention is needed to social equity, with policies oriented around domestic circumstances and the specific challenges faced.

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1. Introduction

Sustainable Development Goal (SDG) 7 calls for “access to affordable and sustainable modern energy for all” but the electricity sector in sub-Saharan Africa (SSA) continues to lag behind other regions. In 2016, 60% of the global population without electricity was located in SSA, compared with 28% in 1990, with nearly 600 m people still lacking access (World Bank, 2018). Scaling up generation capacity as well as expanding transmission and distribution networks will cost around US\$40.8bn a year or 6.35% of GDP (Eberhard & Godinho, 2017). In line with the logic of SDG financing more generally (UN, 2015) the huge scale of finance

required greatly outweighs the scope of public resources and so private finance is considered essential to achieving the SDGs (Mawdsely, 2018).

The call for private investment in developing country energy infrastructure builds on three decades of neoliberal reforms in the sector. In the 1990s, most countries introduced some elements of a market-oriented programme of energy sector reform. Led by the World Bank, key elements include the corporatisation and commercialisation of utilities, unbundling of the different services elements (generation, transmission, distribution and retail supply) and entry of the private sector, alongside the creation of independent regulators (World Bank, 1993).

Some three decades later, the global paradigm has been found to be severely wanting both in terms of implementation and outcomes, in developing countries and in SSA in particular (Eberhard & Godinho, 2017; Foster & Rana, 2020). Rather than

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the wholehearted adoption of the World Bank's policy package, most countries introduced some but not all of the textbook reforms. There is dispute as to whether the reforms have brought about the desired benefits. It is increasingly accepted that contextual factors are important in shaping outcomes, and attention is turning to the political economy of electricity sector reform (see for example, Victor & Heller, 2007; Lee & Usman, 2018; Barnett & McCulloch, 2019; Eberhard & Godinho, 2017; Gore et al., 2019; Baldwin et al., 2019; Barnett, 2014; Foster & Rana, 2020).

A common theme emerging from this literature is that political interest groups obstruct market-oriented reforms, particularly those measures that work against the interests of supportive political constituencies. Control of the electricity sector is considered to be a useful means by which to reward political supporters. Hence, powerful domestic interests resist the introduction of reforms. The findings from this body of research tend to be reflective of wider narratives regarding neopatrimonialism in African politics (see for example, Khisa, 2019; Mkandawire, 2015).

The central issue for many scholars is why market reforms have not been implemented more widely (for example, Eberhard & Godinho, 2017; Victor & Heller, 2007) but the desirability of the reforms is rarely questioned. Yet, while ostensibly intended to "depoliticize" the energy sector, the reform agenda reflects a profoundly Eurocentric worldview. Reforms are treated as a micro level sector adjustment operating at a domestic level rather than located within shifting structures of global capitalism. When we link the reforms with agents beyond national borders, a different set of policy pressures and interests become visible. Furthermore, the reform paradigm has become a firmly rooted cultural vision of what electricity sector development should look like. Yet this is not often linked to the specific problems that are faced, and comprehensively realistic pathways to sustainable equitable progress are lacking. Moreover, equity receives little attention beyond the idea that any pricing schedule that fails to reflect full costs is both inefficient and inequitable because only the wealthy has access to networked electricity.

This paper considers the political economy of electricity sector reform in Zambia through the lens of the Systems of Provision (SoP) approach which views consumption as inherently connected to production, rooted in a specific context (Fine & Leopold, 1993; Fine et al., 2018). This approach provides a useful framework for locating sector reforms within global structures, linking end users with international capital. Drawing on influences across the social sciences, the approach sees outcomes as resulting from the systemic intersections of relations between agents located within broader structures and processes and underpinned by prevailing narratives. Applying this framework to the electricity sector in Zambia, our analysis highlights underlying contextual and systemic factors, which shape the structure of the electricity SoP.

In Section 2, we review the literature on the political economy of electricity reform and situate the SoP approach within this. In Section 3, we outline the context and the core agents of the SoP for electricity in Zambia. A heavy reliance on mining in the economy, very little rural electrification, as well as a recent drought which led to a crisis in hydropower, have shaped the way electricity is provided and consumed. In Section 4, we turn to explore some central elements of the reform paradigm and its interpretation in Zambia. We focus on three core segments of the electricity system. We start with the state utility, Zesco, which has recently experienced financial crisis as low rainfall has depleted hydro sources and the value of the Zambian currency has declined sharply. These developments have strengthened a narrative of state inefficiency although the acute crisis has emerged only recently, and with clearly attributable external causes.

Next we consider the role of the private sector. This has mainly consisted of foreign investment in generation plants in the form of

independent power producers (IPPs). Investments are underpinned by long-term commitments, some lasting decades, to buy fixed amounts of power at dollar-denominated prices set via power purchase agreements (PPAs) with the state utility, Zesco. The private sector is also present in part of the transmission network. These pockets of private investment generate generous returns to investors, mostly financed by Zesco. Finally we consider the commercialisation of the sector and the drive to increase tariffs to cost recovery levels. Our analysis shows that while tariffs are low by regional standards, for many households, a cost recovery tariff is not affordable. Meanwhile the tariffs paid by the mining sector are negotiated in secret.

In the discussion in section five we show that the traditional policy package is not neutral but incorporates inherent inconsistencies and biases. For example, the "common-sense" policy of cost-recovery pricing in this context raises questions of what costs should be recovered, and from whom. The mainstream policy paradigm adopts a remarkable tolerance for returns to capital (via interest and dividend payments) compared with a censorious approach to returns to labour, with heavy criticism of overstaffing of the state utility. Similarly, there is donor concern for the fiscal impact of subsidised electricity tariffs for Zambian households, but less so for the fiscal costs of payments and other transfers to private investors via investment incentives and agreements. Furthermore, it is far from clear that the policies adopted will, in the short to medium term, necessarily alleviate the challenges facing the sector more broadly and Zesco in particular, specifically where private investment in power generation creates long-term liabilities for the state. In a number of respects, these policies are likely to be regressive, for example, where households are financing returns to offshore shareholders through their consumption of electricity.

In our conclusion we highlight our contribution in broadening the scope of political economy in energy to move beyond domestic patronage politics to incorporate the interests both of donors and global capital. Rather than depoliticising the power sector, the reform paradigm is consistent with a global political transition that is promoting some international vested interests over others. This understanding of development resonates with the critical literature on Africa's apparent recent economic success (for example, Khisa, 2019; Beresford, 2016; Taylor, 2016). These authors argue that economic growth has been concentrated in the service and extractive sectors where profits are quickly repatriated providing little gain for many in the region. In addition, Dye (2020) red flags deals with the private sector as these tend to shift the investment burden and risk to recipient governments when they are asked to insure and ensure guaranteed payments and provide a range of fiscal incentives and other subsidies. There is an undoubted need for finance for energy infrastructure. But simply chasing funds without closer regard to the specifics of the underlying political, economic and social structures within which financial flows are directed, creates a narrow framing of both the problems and the solutions. There are significant tensions between the needs of global capital and the realities of weak affordability in the low-income context. The paper suggests that the mainstream narratives and configurations of the policy paradigm pay little attention to the specific needs of the sector in terms of the agents within it or to economy-wide social and distributional outcomes. Finally, the private sector may bring upfront finance for infrastructure but this comes at a price. Ultimately the long-term funding comes only from public (donor or government) resources or user fees.

2. Political economy of electricity sector reforms

Many developing countries implemented wide ranging energy sector reforms in the 1990s drawing on the experience of restruc-

turing in England and Wales, Chile and Norway (Zhang et al., 2007; Jamasb et al., 2017; Eberhard & Godinho, 2017; Urpelainen & Yang, 2019). Led by the World Bank, frustrated at continued inefficiency in developing country energy systems, the reforms centred on regulation, commercialisation and corporatisation of energy utilities as well as private sector participation and, ultimately, competition (World Bank, 1993; Eberhard & Godinho, 2017; Rana & Foster, 2020). The reforms were intended to address many years of under-investment, to ease national fiscal pressures, attract private investment and improve sector governance (Eberhard & Godinho, 2017). Market forces and independent regulation were also intended to “depoliticize” decision-making (Foster & Rana, 2020, p.88; Fritz et al., 2014, p. 2; Lee & Usman, 2018; Gore et al., 2019). The reform package was ideologically driven and rolled out at speed with no evidence as to its impacts (Lee & Usman, 2018; Yi-chong, 2005; Bayliss & Fine, 2008).

The market-oriented electricity sector model has since gathered strength with calls for greater private sector finance in order to implement the SDGs (World Bank & IMF, 2017). Deficiencies in the electricity sector (and in development more generally) have increasingly coalesced around the notion of a “financing gap” (Eberhard et al., 2016; Eberhard & Godinho, 2017). Donor policies are increasingly oriented around “de-risking” infrastructure projects to make them attractive to private investors. Public funds including donor finance are required to be used to “catalyse” private finance (UNDP & UN Environment, p.3, 2018; Eberhard et al., 2016). Numerous donor-sponsored initiatives have been developed to facilitate the flow of global private finance to sectors in need, such as the Global Infrastructure Facility and the G20 Infrastructure Hub. Governments are called upon to create an appropriate “enabling environment” to attract investment, including tariff reform to strengthen the financial viability of (typically) state utilities (Avila et al.: 31, 2017; Huenteler et al., 2017; AfDB, 2018; UNDP & UN Environment, p.2, 2018; Eberhard et al., 2016).

Some three decades since it began, the power sector reform paradigm has been found severely wanting on three main fronts. First, implementation has been limited with only a handful of countries fully adopting the entire set of policies (Jamasb et al., 2017; Foster & Rana, 2020; Urpelainen & Yang, 2019). In much of SSA, full privatisation remains rare and implementation has largely stalled at establishing regulation and private participation in electricity generation. This is known as the “hybrid” model with some elements of market reform but the state dominance retained (Eberhard & Gratwick, 2011; Eberhard & Godinho, 2017; Urpelainen & Yang, 2019; Kapika & Eberhard, 2013). Rather than being a stepping-stone to a full market structure, this hybrid has proven to be remarkably stable (Victor & Heller, 2007).

One aspect of reforms which has been particularly problematic is the adoption of cost recovery pricing (Foster & Rana, 2020). Under-pricing of electricity and the cross subsidisation from industrial customers to households are seen as major source of inefficiency and underinvestment (Flochel & Gooptu, 2017, p.6). These are considered to create a drain on fiscal resources, incentivising over-consumption, crowding out public spending on health, education and investment. The use of such measures to pursue social goals is considered misguided as it is the richer groups in society that have electricity access, and so benefit from such subsidies (Huenteler et al., p. 5, 2017; Jamasb et al., p. 204, 2017). Cost recovery pricing is considered essential not just for the financial viability of utilities but also to attract private investment. However, in general, tariffs continue to be less than costs (Rana & Foster, 2020; Lee & Usman, 2018) and large cross subsidies from industry remain (Foster & Witte, 2020).

Second, it is unclear that the reforms have brought about the desired outcomes (Jamasb et al., 2017; Urpelainen & Yang, 2019; Gore et al., 2019; Lee & Usman, 2018). There is some empirical sup-

port for positive outcomes (Bacon, 2018; Eberhard & Godinho, 2017) but the benefits are by no means guaranteed (Foster & Rana, 2020; Gore et al., 2019; Victor & Heller, 2007; Hall & Nguyen, 2017) and technical improvements tend not to reach end users (Jamasb et al., 2017). Variations in implementation are not reflected in variations in outcomes (Victor & Heller, 2007). Moreover, some countries (including Morocco, Vietnam and the Indian state of Andhra Pradesh) that have not implemented reforms have performed equally as well stronger implementers according to a range of outcomes including security of supply, social inclusion and environmental sustainability (Foster & Rana, 2020). In SSA, the past three decades have seen little to no improvement across key power sector indicators in the lower income countries of SSA (Eberhard & Godinho, 2017).

Third, reforms are not associated with significant improvements in social outcomes (Foster & Rana, 2020; Urpelainen & Yang, 2019; Lee & Usman, 2018). Access rates remain below 50% in much of SSA (Eberhard & Godinho, 2017). Low-income countries face major challenges with affordability (Foster & Witte, 2020). There are inherent contradictions between social objectives and the core reform policies which emphasise commercial imperatives such as the laying off staff, disconnecting non-payers and increasing tariffs (Yi-chong, 2005; Wamukonya, 2003).

The scope of disappointing outcomes from the neoliberal reforms has prompted greater attention to the preconditions and contextual factors which shape outcomes (McCulloch et al., 2017). In the electricity sector, the political economy context is now considered crucial to the implementation of the model (Eberhard & Godinho, 2017; Bain, 2016; Foster & Rana, 2020; Lee & Usman, 2018). Much of this literature points to the role of vested interests in maintaining the status quo and resisting market-oriented policy change. This is because reforms may penalise key constituencies such as labour (Victor & Heller, 2007). Furthermore, power sectors were often developed by colonial authorities to serve urban centres and extractive industries, which has led to close relationships between post-colonial and economic elites in the power sector and the extractive sectors (Eberhard & Godinho, 2017; Gore et al., 2019; Victor & Heller, 2007). Moreover, subsidised electricity has incentivised investment in energy intensive industries, and users of cheap power are strong advocates for retaining the status quo (Victor & Heller, 2007). In such cases political support is dependent on the ability of political elites to provide dominant economic interests with subsidised power. The power of incumbents to resist change is widely documented with reference to the politics of transition to sustainable energy sources (see Baker et al., 2014; Baldwin et al., 2019; Baker, 2015; Newell & Phillips, 2016).

Political economy research in the power sector has shaped donor practices, and Zambia provides a case study example (Barnett et al., 2016, p.9). According to Levy and Palale (2014), progress with the standard reform model came to a halt in the early 2000s because policies such as the unbundling and restructuring of the state utility would eliminate options for discretionary rent allocation. Tariff increases were resisted because of the political value of the white-collar urban residents. The state-owned utility provided scope for discretionary resources to “lubricate the political process” and access to jobs also offered a source of patronage. The donor policy response was to move away from the “cookie cutter” approach and instead to “go with the grain”, working with reform “champions” to increase support for reforms. Levy and Palale (2014) document how such an approach to sector reform was instrumental in breaking the “log-jam of power sector reform” in Zambia (Cited in Barnett et al., 2016, p.9).

Thus much of the energy sector political economy literature is situated within a wider orthodoxy that identifies the neopatrimonial nature of African politics, with deep-seated clientelism and

patrimonial operations, as the major obstacle to successful market reforms (Khisa, 2019). Rana and Foster (2020) consider that electricity services “are a natural focus for patronage politics” (p.5). The narrative of neopatrimonialism has become deeply ingrained in academic and policy circles (see Mkandawire, 2015, for a critique). But energy sector reforms in SSA also intersect with global agents and structures. International financial institutions (IFIs) have influence that goes beyond setting conditions for donor finance. Indeed, implementation was not always reliant on coercive conditionality. Yi-chong (2005) reports that often local elites were “eager pupils” keen to look to western models to address the challenges of their electricity systems. The desirability of reforms was spread through diverse means such as capacity building programmes and overseas study visits (Baldwin et al., 2019; Victor & Heller, 2007; Foster & Rana, 2020). International consultants promoted a standard model based on their experiences in other countries rather than local circumstances (Bain, 2016; Victor & Heller, 2007; McCulloch et al., 2017; Lee & Usman, 2018). For Kashwan et al. (2019) in relation to international development more broadly, the influence of IFIs goes beyond imposing policy conditionality or even promoting specific policies to become one of framing the development agenda and dominating development discourses.

The approach taken in much of the political economy literature seeks to account for the reasons why reforms were not more widely implemented (Victor & Heller, 2007; Eberhard & Godinho, 2017). But the merits of the reforms and their Eurocentric origins are rarely questioned. The development model has been unchanged and even reinforced despite evidence of its failings, for example, when the model countries such as Britain moved to increase interventionism (Jamasb et al., 2017). The promotion of infrastructure as an asset class is seen as double win, both reducing the financing gap as well as serving the interests of global capital seeking investable opportunities (Bayliss and Van Waeyenberge, 2018). However, the entry of the international private sector raises tensions and contestations, requiring attention to the “bankability” of infrastructure investments rather than the long-term social outcomes. For Newell and Phillips (2016), on renewable energy investment in Kenya, reforms need to be situated within the context of global relations with consideration of whose interests are being addressed (p.47): **“In an investor-led, donor-shaped policy context where finance and technology choices are shaped by private and international actors and state elites, the interests of poorer groups in Kenyan society are easily marginalized”**. Inevitably there is a risk of opportunism on the part of the private sector. Moreover, in times of crisis, countries are likely to accept unsolicited proposals without fitting these into a comprehensive, competitively tendered process. As Eberhard and Gratwick write (2011, p. 5543): “Although it is easy in hindsight to accuse stakeholders of acting imprudently, in the face of emergencies, the actual conditions of load-shedding and shortages appear to have provided few alternatives”.

Political economy, then needs to incorporate the pressures and interests of global agents and structures as they intersect with domestic interests. Our interest is in a systemic approach that connects the different segments of the sector, linking households to international agents via the state utility. For this reason, we have drawn on the SoP approach which was originally devised in relation to consumption studies (Fine and Leopold, 1993; Fine et al., 2018). The essence of the approach is that consumption does not stem from individual preferences but results from the multiplicity of factors in the chain of production as well as the wider context, including the nature of the good itself. The approach draws on influences across the social sciences to devise a comprehensive framework for understanding the drivers of consumption outcomes which have been distilled into five core themes: agents,

relations, structures, processes and material culture. The nature of the good itself shapes production and consumption. In electricity, traditionally, production has been capital intensive but technology is rapidly changing. Electricity offers immense benefits for society in residential, social and economic consumption, and is a vital input to most economic processes. For this reason, there is a public welfare interest in universal access. In the energy sector, the SoP approach provides a framework for connecting the agents and relations that underpin provisioning to include not just consumers and producers but also those that shape the SoP such as the state, donors, IFIs, investors and financiers. These are embedded within a prevailing narrative that promotes the standard reform elements as the “common sense” approach.

While this study is ambitious in scope, not all areas of the electricity SoP can be covered in detail and we faced limitations in availability of information. Hence the elements of the SoP are reviewed selectively. Our starting point was to map the core agents in the SoP and from there to drill down into core elements of the traditional policy paradigm to unpack how these relate to the agents involved and the reality as experienced in Zambia, drawing on stakeholder interviews, publicly available company information and a range of other sources as documented. Our focus is on the intersections of the policy paradigm with international agencies and the distributional outcomes from these. But, as our analysis shows, the supposed technocratic and apolitical approach is not neutral or objective. By connecting the elements of the SoP, we show how these seemingly technocratic policies within the global paradigm have promoted the interests of international capital in ways which are ultimately supported by Zambian taxpayers and electricity consumers.

3. The System of Provision for electricity in Zambia

The Zambian economy is dominated by copper production which accounts for around 77% of the country's exports (World Bank, 2017a). The development of the copper sector during colonial times led to an exceptionally high dependence on hydropower for electricity. The state-owned mining sector in the Copperbelt, Zambia Consolidated Copper Mines (ZCCM), was privatised in the late 1990s. While privatisation brought investment (Whitworth, 2015), it was associated with a devastating impact on local communities in the loss of formal employment and the cessation of welfare services (including electricity) which had previously been supported by the mines (Nel et al., 2017; Fraser & Lungu, 2006). The country experienced rapid economic growth in the 2000s. However, income distribution remains highly unequal (Bhorat et al., 2017; IGC, 2017). Hence little of the economic growth fed through to the population. Despite average annual economic growth of around 5%, an estimated 41% of Zambians live in extreme poverty (World Bank, 2017b). Rural poverty was around 78% in 2015 and this proportion has changed little since the 1990s.

A heavy drought in 2015/16 caused a severe depletion of water levels in the country's main reservoirs, triggering a hydro crisis and in 2016, national electricity generation fell by 13% from the previous year. The drought left the country with a power deficit at the peak of the crisis equivalent to almost half of total generating capacity (GCF, 2018), resulting in load-shedding and major interruptions in supply. Power shortages were associated with substantial economic, social and welfare costs. Hydropower continues to be unreliable and load-shedding continues.

Fig. 1 provides an overview of the main agents in the SoP for electricity within Zambia. The white arrows correspond to the supply of electricity while the black dotted arrows correspond to impact in terms of policy design, financial flows and wider narratives in the sector.

The sector is dominated by the state-owned, vertically integrated utility, Zesco Ltd. Zesco was formed in 1970 under the Zambia Electricity Supply Act and brought together the electricity undertakings that had been previously managed by local authorities. Zesco generates power, buys power from Independent Power Producers (IPPs) and trades with the Southern Africa Power Pool (SAPP) (see the left side of Fig. 1).

Power generation has, for decades, been dominated by two large hydro plants owned by Zesco. However, declining rainfall has led to a reduction in the share of hydropower from 94% of total installed capacity in 2015 to 80% in 2018. Following the electricity crisis there has been a deliberate policy to diversify energy sources, with new fossil fuel investment coming from IPPs (see Fig. 2, and discussed in more detail below).

Zesco is responsible for most of the transmission and distribution of electricity throughout the country, owning about 92% of the total grid-connected installed capacity. The exception is in the Copperbelt region, where the Copperbelt Energy Corporation (CEC) transmits electricity purchased from ZESCO at high voltage and distributes it to mining operations (ZIPAR, 2015). During the electricity crisis, in addition to power sourced from Zesco, CEC imported power directly for the Copperbelt mines from the SAPP.

Zesco sells to a diverse range of end users (see the right of Fig. 1) including residential, business and mining customers. The mining sector consumes over half of electricity produced in Zambia (Fig. 3). Residential users account for 32% with other categories, including manufacturing, accounting for less than 15% between them. In addition to existing consumers, the SoP is concerned with the millions in rural areas that still lack access to electricity. According to the 2015 Living Conditions Survey Report (CSO, 2016), 31% of households stated that they were connected to electricity. Access has improved for urban households, but in rural areas, home to about 57% of the population, only about 4.4% of households has connection to electricity, compared with 67.3% of urban households (CSO, 2016). Access is less than one per cent for the poorest 20% of the country (PMRC, 2017).

The state is active in the sector in different ways, in policy-making through the Ministry of Energy (MoE) and through various state agencies, including Zesco itself.¹ The Rural Electrification Agency (REA) is mandated to provide electricity infrastructure in rural areas of Zambia. The Energy Regulation Board (ERB) is responsible for implementing aspects of energy policy, notably licensing, tariff-setting and regulating quality of supply, in accordance with the provisions of the 1995 Energy Regulation Act. However, in practice ERB regulates Zesco only, using a series of key performance indicators (KPIs). For the rest of the sector, ERB just provides technical oversight and sets prices. The influence of the mining sector has led to the specific structure of the electricity system where the mines are treated separately from other consumers. While Zesco operates as a monopoly, for much of the mining sector there is a monopsonistic structure where Zesco supplies CEC. Electricity tariffs for the mining industry and other large consumers, including CEC, are negotiated privately and details of these are not in the public domain.

Numerous external donors are also active in the sector. In Fig. 1 donors are shown as linking directly to the state and through this they are involved in generation and transmission and rural electrification. Donors provide finance and policy advice as well as more subtle influence. According to Levy and Palale (2014, p. 120) Zambia was “something of a donor favourite” in the 1990s. As men-

tioned above, adjustments to the World Bank's approach to policy advocacy, for example, working with specific key stakeholders, is considered to have been successful in achieving tariff increases.

In many ways, then, the electricity sector represents a textbook case of the hybrid model outlined in the previous section, with a corporatized, state-owned monopoly utility and an increasing role for IPPs. Also in common with other developing countries, Zambia is heavily dependent on mining and has low rates of rural access. These structural features have played a role in the way that the reform package has been adopted as the next section demonstrates.

4. Paradigm elements revisited

This section turns to the way that the standard reform elements are working in practice in Zambia. We have selected three agent groups from Fig. 1 that link to core elements of the policy paradigm: the performance of the state utility, private sector participation (mainly in generation) and commercialisation (relating to household consumers). Drawing on the SoP approach, we unpack and join up the realities behind the prevailing narratives in each of these, below.

4.1. Zesco's performance

Despite being a public utility, the financial performance of Zesco is not all bad. It has one of the highest bill collection rates in SSA, at 96% in 2014, because almost all residential customers are on prepaid meters (Trimble et al., 2016). Kapika and Eberhard (2013) report an improvement in Zesco's financial performance between 2004 and 2011, although they also report a decline in technical performance. However, Zesco's financial performance deteriorated dramatically in 2015 and 2016 resulting from a surge in costs due to emergency power imports in 2015/16 to compensate for the decline in hydro power (World Bank, 2017b; IMF, p., 201749). In addition, the financial position of the utility was exacerbated by a sharp fall in the value of the local currency in 2015/16. The Kwacha underwent a period of stabilisation but has recently experienced rapid depreciation since the Covid-19 crisis.

During the hydro crisis, power was imported at a cost considerably higher than the selling price. In 2016 the average price of imports was US\$0.15/kWh. However, the average selling price charged by Zesco was just US\$0.06/kWh (Zesco, 2016; Siliya, 2015). Costs increased dramatically and the healthy operating profit of the previous four years became a loss in 2016 and 2017. However, until then, the company's operating profit was reasonably stable (Table 1).

Historically, before the recent crisis, production costs were very low due to reliance on cheap hydropower, but these have also reportedly been held down because of a lack of maintenance and underinvestment (Levy and Palale, 2014). Zesco has borrowed heavily recently, mainly from Chinese banks. Finance costs as a share of revenue increased from less than 1% to over 5% between 2012 and 2017. Gearing (the ratio of debt to equity) increased substantially between 2012 and 2015. Gearing came down by half in 2017 but this reduction was due to a tripling of equity rather than a reduction in debt (Zesco, 2017). A substantial portion of the debt has been spent on increasing Zesco assets, investing mainly in property, plant and equipment (Zesco, 2016). But generation sent out from large hydro plants, which account over 98% of Zesco's power produced, has been fluctuating (Fig. 2).

Zesco has then seen a sharp decline in financial performance, which would appear to be a recent phenomenon and related to the costs associated with the drought and currency issues. The

¹ There are several other state agencies involved in the energy sector such as the Office for the Promotion of Private Power Investment (OPPP), tasked with increasing private investment in private power generation and transmission; the Zambia Development Agency which promotes trade and investment in Zambia and the Industrial Development Corporation (IDC) which acts as an investor in state-owned enterprises.

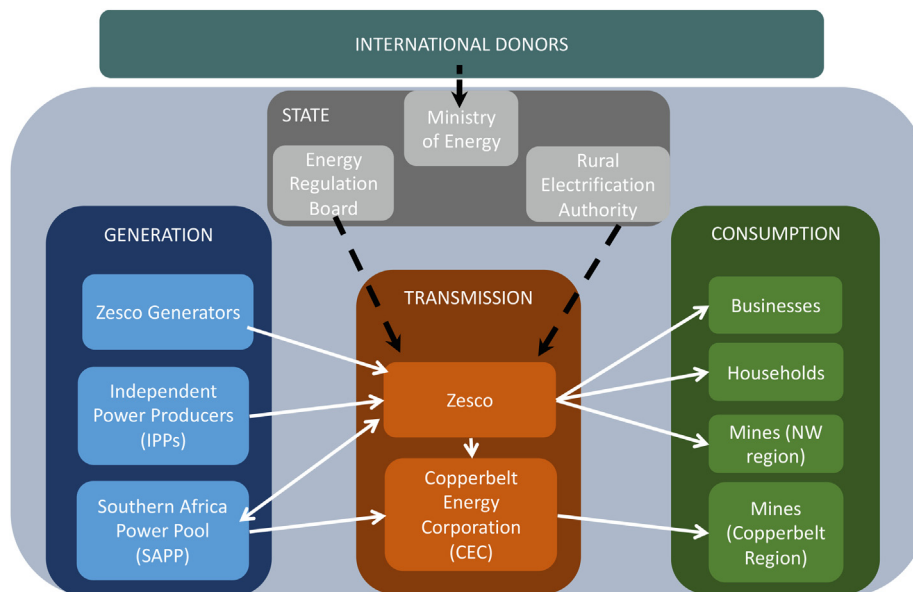
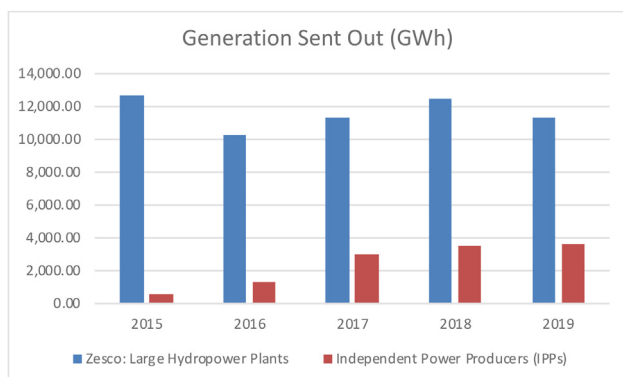
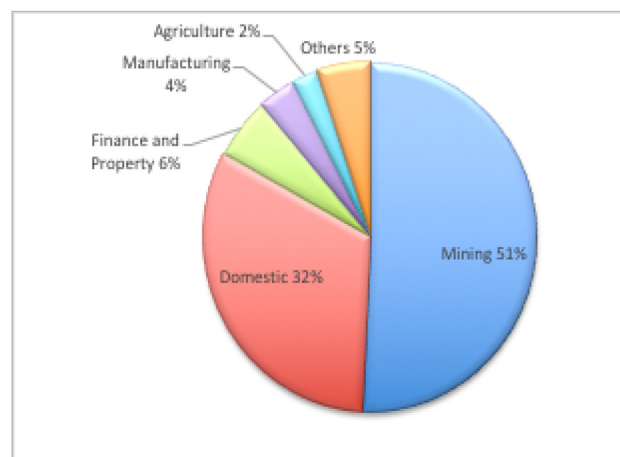


Fig. 1. Agents in the System of Provision for electricity in Zambia. In addition to these main agents, there are numerous smaller organisations that are not considered here such as the charity-funded Zengamina Hydro Project which generates off-grid power in the north west of the country and the North Western Energy Corporation which distributes electricity to some households in North-Western Province.



Source: ERB various years

Fig. 2. Changing trends in generation sent out (94% total electricity generated). In total these two sources account for around 94% of generation with some additional small diesel generation and off grid hydro power plants not included in the chart.



Source: Compiled using data from ERB 2019

Fig. 3. Share of National Electricity Consumption by Economic Sector, 2018.

mining sector pays for power in USD. The Zesco accounts show that although the mines accounted for just over 50% of sales volume they provided over 60% of sales revenue due to the declining value of non-mining receipts, paid in Kwacha (Zesco, 2017). The weak revenue position has heavily boosted the narrative of state inefficiency, strengthening calls from international agencies to increase financial viability through reducing costs and raising prices (IMF, 2017). Until the hydro crisis in 2015, Zambia had the lowest cost electricity in SSA and the lowest tariff, and Zesco was reasonably profitable (Table 1). While, along with many other countries in the region, Zesco was deemed to be under-pricing electricity, the amount of undercharging per kWh was regarded as comparatively small, calculated at \$0.02, less than Kenya (0.03) and Botswana (\$0.13) (Trimble et al., 2016).

Zesco's staffing levels are also considered to be too high. A comparison of electricity utilities in SSA concluded that Zesco was overstaffed by over 70% (Trimble et al., 2016). This finding has had a significant impact on sector narratives. For example, in the

financing appraisal of the West Lunga Scaling Solar Energy project, the World Bank (2017c: 28) relies upon the Trimble et al. study, which it in fact commissioned, to note that "that ZESCO's staffing ratio is one of the highest in power utilities in sub-Saharan Africa". In addition, the mining sector rejected electricity tariff increases in part because of the alleged "inefficiencies" of Zesco. However, the Trimble study is based on superficial indicators, notably the number of connections per employee. With the majority of electricity consumed by the mining sector, Zambia has some very large-scale customers. It is difficult to draw conclusions, as the World Bank does, concerning overstaffing. This is not to say that Zesco is not over-staffed but that this kind of rhetoric needs more careful analysis with an objective case-specific standard by which to assess staffing levels across functions within the institution. A more appropriate comparator would be staff per GWh sent out but even then more granular analysis would be needed to assess appropriate staffing levels for specific functions and processes.

Table 1
Zesco Selected performance indicators, 2013–2017

	Mar-12	Mar-13	9 months to 31 Dec	Dec-2014	Dec 2015	Dec 2016	Dec 2017
Operating profit margin %	16.42	17.58	10.99	13.26	0.30	−1.66	−3.64
Staff numbers	4,782	4,949	6,577	6,771	6,801	6,791	6,772
Finance costs % Revenue	0.41	0.52	0.68	1.15	0.78	3.94	5.37
Gearing ratio (debt:equity)	41	45	50	58	64	62	34
Cost of electricity sector subsidies (% of GDP)	0	0	0	0	0.2	0.5	0.3

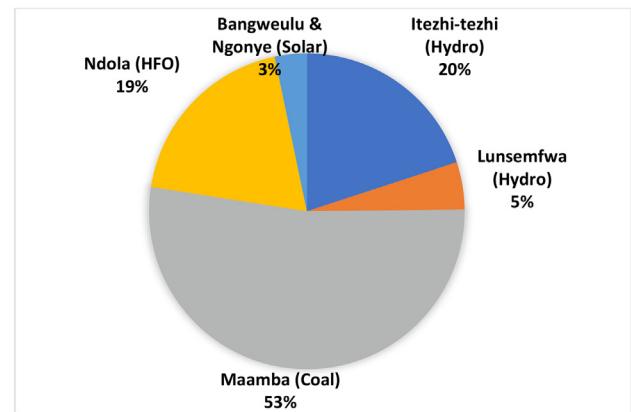
Source: Authors' compilation from Zesco Annual Reports 2014–2017; IMF, 2017.

The recent crisis has ramped up calls to address so-called “under-pricing”. The IMF (2017) considers what they term the “large and not well-targeted subsidies” (IMF, 2017, p.9) in Zambia's energy sector to be one of the main sources of the country's fiscal challenges (along with a large public sector wage bill and fuel and agriculture subsidies). They insist that **a shift to cost reflective tariffs is required not just to ease pressure on the budget but also to “attract much needed investments into the energy sector”** (IMF, 2017, p. 15). But as Table 1 indicates, these subsidies have only emerged since 2015 and were previously non-existent. Similarly, Zesco had a stable healthy operating profit up until 2015 when the electricity crisis began to impact on financial performance. The notion of under-pricing seems then to be a phenomenon related to the recent electricity crisis with clearly attributable external causes rather than endemic to the sector.

4.2. Private sector participation and privatisation

In common with many developing countries, private sector participation is largely in generation capacity and this has increased substantially in recent years. In Zambia in 2019, IPPs accounted for nearly 24% of total electricity generated compared with just over 4% in 2015 (ERB 2019 and Fig. 2). Since 2016 around 10% of electricity has come from a coal-fired IPP, Maamba Collieries. From 2014 a heavy fuel oil (HFO) IPP, Ndola, has been supplying electricity, accounting for around 4% of installed capacity in 2018 (ERB, 2019). In 2018 two solar powered IPPs came on stream providing around 3% of capacity. Two further IPPs Itezhi-Tezhi and Lunsemfwa provide power from hydro sources (Fig. 4). While mostly the details of the finances for these projects are not in the public domain, as far as was possible, some of the ownership structures and financial flows are explored below.

Ndola Energy Company Limited (NECL), which owns and operates the HFO 105 MW² power plant in the Zambia Copperbelt town of Ndola, is owned by a UK registered company, Great Lakes Africa Energy Ltd (GLAE). GLAE is controlled by Humphrey Kariuki, a Kenyan-based billionaire. The Ndola IPP is underpinned by a PPA with Zesco but the terms are not made public. However the company accounts indicate that the arrangement has been remarkably profitable.³ Since it was set up in 2013, the project has consistently had a net profit margin of around 30% with a post tax profit of more than US\$41 m in 2018. Yet, the company has paid almost no tax (aside from a payment of less than 1% of profit in 2014). In the UK the company has made use of a deferred tax asset and in Zambia the company benefits from investment incentives offered by the Zambia Development Agency (ZDA) which provides full tax exemption until 2019 and partial exemptions until 2024 (GL Africa Energy



ERB Statistical Bulletin various years

Fig. 4. Generation sent out by IPPs 2015–2019 (GWh).

Ltd, 2018). The investment is insulated from risk. The 15-year PPA guarantees a fixed return and the contract price to Zesco is linked to the US Producer Price Index. In addition, under the terms of a Fuel Supply Agreement between GLAE and the Ministry of Energy the company is liable to pay for HFO only once this amount has been recovered from Zesco. HFO accounts for 66% of the company's operating costs (GL Africa Energy Ltd, 2018).

Zambia's largest IPP, Maamba Collieries Ltd (MCL), the country's first coal-fired power plant, began operation in 2016 (GCF, 2018) during the electricity crisis. MCL is majority owned (65%) by Nava Bharat (Singapore) (NBS), a wholly owned subsidiary of Nava Bharat Ventures, an Indian-listed business conglomerate. The Zambian state-owned ZCCM Investment Holdings owns 35% of the project company. The project is financed by 70% debt and 30% equity from sponsors (World Finance, 2016a). The IPP was awarded “Project Finance Power Deal of the Year” by World Finance Magazine in 2016 (World Finance, 2016b) on account of the high volume of finance raised from international banks including from Chinese financial institutions, and because the project is financed on a non-recourse, purely project finance basis. However, the ability of the project to raise finance successfully without recourse to the sponsors (the equity investors) stems from the conditions that have been taken on by the Government of Zambia. The project is strongly supported by the Zambian state, the state itself being minority shareholder (through ZCCM-IH). There is a 20-year, dollar denominated PPA with Zesco which is guaranteed by the Government of Zambia. In addition, the cost of power generated is high, with Zesco committing to pay MCL around US\$0.1035/kwh (GRZ, 2017).

Two IPPs for solar power generation have recently been completed as part of the World Bank's Scaling Solar programme. These build on the donor-sponsored GET FIT Zambia programme which promotes renewable IPPs on a smaller scale.⁴ Details of the ownerships and the financing for these two projects are set out in Table 2.

² Phase one, a 50MW plant, was completed in 2013 and phase two, adding 55MW, was completed in 2017.

³ GL Africa Energy Ltd is incorporated, domiciled and registered in England (Company No. 08721406). The accounts state that “all of the Group's revenue arose from the supply of electricity within Zambia” and “All of the Group's revenue is earned from the supply of electricity within Zambia” Hence there is “one business segment in one geographical location” (GL Africa Energy Ltd Annual report and financial statements year ended 31 December 2016, p.23).

The Zambian government has a 20% stake in both projects. The Bangweulu Power Company is owned by Neoen, a French company which is majority owned by Impala SAS, a private equity investor (Neoen, 2018). Enel is an Italian multinational company, listed on the Milan Stock Exchange. The projects are underpinned by PPAs with take-or-pay clauses that require Zesco to pay for all power produced by the projects regardless of whether it is needed. In the event of default from Zesco, the government steps in and buys all the assets at a pre-determined price to cover outstanding equity, returns, debts and transactions costs (Kruger and Eberhard, 2019).

The projects are seen as ground-breaking due to the tariffs which, at the time of their announcement, were the lowest solar PV tariffs in Africa (Kruger and Eberhard, 2019). While intended to use public funds to “unlock” private investment in solar power in emerging markets⁵ Table 2 shows that a relatively small proportion of project funds comes from equity investors or commercial borrowing. The majority of project funds in both cases come from concessional donor finance. Indeed, OPIC (since re-named the Development Finance Corporation) is the US Government’s development finance agency, expressly designed to help American businesses invest in emerging markets and to advance US foreign policy and national security priorities. There are echoes here of the much criticised notion of “tied aid” where development assistance was used to offer aid on the condition that it be used to procure goods and services from the provider of the aid. Unlike tied aid, however, this is not grant but effectively loan finance that is ultimately repaid from the state utility via the 25-year PPA.

These projects are ultimately financed by Zambian electricity consumers and tax payers, through Zesco. While they bring benefits for Zambians through energy generation, and the cost of power is low compared with fossil fuel generation, they also generate secure profits for investors. The engineering, procurement and construction (EPC) for these companies is also with international companies. Equity returns are reportedly in the 9–10% range for the winning bids. This is reported to be lower than the normally expected 15% for such projects, and this is attributed to the prominent role played by development partners. The low tariffs are due to a combination of concessional aspects to the projects including concessional debt from DFIs, no interconnection costs as these are borne by Zesco, low development costs and Zambian tax incentives (Kruger and Eberhard, 2019). By placing more demands on the Zambian state and using public and concessional resources, the project has lowered private sector risk. This in turn means that lower profitability is tolerated, and tariffs are lower than in similar projects. But still, these schemes are located within a framework where substantial public subsidy is devoted to re-constructing rural electrification in terms of a revenue stream for global capital. While these projects bring upfront finance, ultimately these investments in generation plants are funded, along with returns to shareholders in France, USA and Italy, by Zambian tax payers and end users via Zesco.

Private sector involvement is not just confined to power generation. CEC emerged from the privatisation of the mining sector and was formerly the Power Division of the state-owned ZCCM. While mines are supplied by CEC, non-mining (household and business) consumption in the Copperbelt area became the responsibility of Zesco after privatisation. Zesco now has to pay a fee to CEC for “wheeling” (i.e. the use of CEC’s supply and distribution network) when it takes the power from the CEC network and sells it to communities in the Copperbelt. CEC buys at least 30% of the electricity produced by Zesco. For Kapika and Eberhard (2013), the successful privatisation of CEC and its subsequent resale to a consortium led by local investors provides an example of new avenues through

Table 2

Financing and ownerships of Scaling Solar projects, Zambia.

SPV name and date contract signed	Bangweulu Power Company (2017)	Ngonye Power Company Ltd (2018)
Owners of SPV	<ul style="list-style-type: none"> o Neoen (France) (55%) o First Solar (USA) (25%) o GRZ (20%) 	<ul style="list-style-type: none"> o Enel (Italy) (80%) o GRZ (20%)
	55 MW	34 MW
Total finance	US\$60.4 m	US\$45 m
Financing	<ul style="list-style-type: none"> o IFC A loan US\$13.3 m o IFC Canada Climate Change Programme Loan US\$13.3 m o OPIC¹ Senior loan US\$13.3 m o GRZ US\$4.09 m o Neoen: US\$11.26 m o First Solar: US\$5.12 m 	<ul style="list-style-type: none"> o IFC A-loan US\$10 m o IFC Canada Climate Change Programme Loan US\$12 m o EIB loan US\$11.75 m o GRZ US\$2.25 m o Enel US\$9m
PPA duration	25 years	25 years
EPC contract	Sterling and Wilson (India)	Enel subsidiaries
Tariff / kWh	US cents 6.015	US cents 7.84
GWh per year	94	61

Source: compiled from various sources including press releases from investors; (IFC, 2017) and IJ Global, 2019a; 2019b; World Bank, 2017c.

¹ OPIC is the US Government’s development finance agency which is designed to help American businesses invest in emerging markets and to advance US foreign policy and national security priorities.

which the sector can be funded and has facilitated the emergence of an indigenous private managerial class. Since 2006, CEC has been owned by a consortium of Zambian investors via a company registered offshore and the operation has been highly profitable. In 2017 the company was majority (52%) owned by Zambian Energy Corporation (Ireland) Ltd which is ultimately owned by Batoka Energy Holdings Limited (CEC, 2017), a company registered in Ireland. CEC paid out dividends of over US\$100 m over the five-year period from 2015 to 2019.⁶ The Chair of CEC, Hanson Sindowe, who orchestrated the 2006 takeover, is now one of the country’s richest men (Forbes Africa, 2014).

Privatisation in the electricity sector, then has been highly profitable for some. Investors are mostly foreign and even Zambian shareholdings, as with CEC, are now registered offshore. Mostly, shareholder returns are financed by Zesco and considerable public resources have been devoted to creating an attractive investment climate for investors in solar energy.

4.3. Commercialisation and cost recovery pricing

There have long been tensions surrounding price increases in Zambian electricity (Kapika and Eberhard, 2013). In 2017, tariffs were increased by 75% for non-mining customers (Zesco, 2017). Zesco operates an increasing block tariff structure, charging a residential tariff of US\$0.03 for the first 100kWh, US\$0.05 for consumption between 101 and 300kWh and US\$0.11 for consumption over 300kWh. The regulator calculates an average tariff of US\$0.0633 (ERB, 2019). Meters are almost all prepaid. Mining tariffs are not made public. Table 3 shows estimates of the affordability of different tariff options.

Table 3 indicates that recent tariff increase for 2020 will consume around 6% of incomes for urban households and 23% for rural households. The tariff of the cheapest Scaling Solar project (excluding other costs such as transmission and distribution) would account for just under 10% of urban incomes and 38% for rural households. The tariff paid for the Maamba Collieries PPA would amount to 16% of urban household incomes and 62% for rural

⁵ <https://www.scalingsolar.org>, accessed 6 February 2019

⁶ Copperbelt Energy Corporation Company Accounts

Table 3
Costs to households of different tariffs.¹

		All Zambia	Rural	Urban
Average household consumption per month (KWh)		266.86	266.86	266.86
Monthly household income (US\$: US\$1 = K19)		94.81	42.63	165.92
2020 tariffs	Monthly cost to households (USD)	9.90	9.90	9.90
	Share of monthly income (%)	10.50	23.22	5.97
IPP tariff US\$0.0602/KWh (Scaling Solar project)	Monthly cost to households (USD)	16.10	16.10	16.10
	Share of monthly income (%)	16.90	37.77	9.70
IPP tariff US\$0.10/KWh (Maamba PPA)	Monthly cost to households (USD)	26.69	26.69	26.69
	Share of monthly income (%)	28.00	62.61	16.09

Source: Authors' computations from: Living Conditions and Monitoring Survey (LCMS) 2015 for household size, urbanisation rate; Bank of Zambia for exchange rate data (August 2020 average); World Bank online data on access; Energy Regulation Board 2020 for 2020 Tariffs.

¹ While rural access is low we assume that where connected, household consumption is the same as urban. Average household consumption is computed by dividing total domestic electricity consumption in MWh by total number of households, with the latter being found by dividing the 2018 estimate of the total population by the LCMS 2015 data for average household size. The most recent available income data is for 2015 (CSO 2016). Subsequent inflation is largely due to increases in food prices and non-food items such as transport, housing, fuel and utilities (ZSA, 2020). There is no indication that incomes have risen but rather they are likely to be constrained by other price rises. Hence we have not adjusted the 2015 income data. Cost recovery tariffs do not include transaction costs to Zesco once power has been purchased from IPPs.

households. A tariff that recovers the full cost of IPP generation as well as the distribution, transmission and administration costs is clearly unaffordable for most households in Zambia.

Raising prices is considered essential to restore financial viability of Zesco. However, the distributional impacts are more complex. First, while they may consume little electricity directly, poor households suffer from the indirect effects that put up prices for goods that use electricity as an input (Maboshe et al., 2019; PMRC, 2017). Second, while a cost recovery tariff may improve liquidity for Zesco, passing the inflated production costs from IPPs, outlined above through to end users will contribute to a more regressive structure at the global level, as Zambian households finance returns to IPP investors. Third, even with the price rises, the increased tariff is not sufficient to cover even the basic cost of the cheapest solar plant, so simply increasing tariffs is not sufficient to create financial viability. **High cost IPPs continue to be unaffordable.** The cost recovery narrative does not put in context the actual living conditions of Zambian households and therefore fails to clarify from whom costs will be recovered. Continuing to focus on households as the target for recovery of costs risks diminishing household welfare.

Finally, so far, the price increase applies only to non-mining customers (Zesco, 2017). Attempts to increase the tariff paid by mining companies have been met with strong resistance. In 2014, an attempt by Zesco and CEC to raise mining tariffs resulted in court action. In April 2017 an approved price increase was again opposed by mining companies and the result was a significant drop in revenue from the mining sector as a result of the tariff dispute (Zesco, 2017). Revenue from mines is far more important to the financial viability of Zesco than that from households, since the mines collectively represent the largest consumer group. Increasing residential tariffs is not going to rectify the sector's viability if the customers that dominate consumption are able to override (or negotiate in their favour) price-setting practices.

The Chamber of Mines has been vocal in its criticism of Zesco, stating that mines should not have to pay for an inefficient utility, covering high staff costs, losses and leakages (Chamber of Mines 2017, p.21). The mines are strong supporters of a cost reflective tariff as this would likely result in a lower rate for mines relative to other consumers as their costs would be lower than for others (Chamber of Mines, 2017). It is much cheaper to provide electricity to mines than to households because they can receive it at high voltage and their consumption and payment is predictable. This highlights the need for careful analysis of the distributional effects of ostensibly neutral measures in the standard policy paradigm, such as a tariff that is reflective of costs.

5. Discussion

The previous section shows that much of the reform paradigm is problematic when the different components of the SoP are joined up and set in the wider context. Some issues are discussed below. **First, the measures of the reform paradigm do not address, and may even exacerbate, the specific problems that Zesco faces.** The utility is in major financial difficulties due to a specific set of constraints from shortages of hydropower and declining currency value. While the entry of the private sector has raised investment finance in the short term, in the longer term these investments will lead to the extraction of Zesco funds to offshore shareholders. Zesco's loss in 2017 is attributed to an increase in the purchase of power from IPPs at an average tariff that is higher than that paid by customers (Zesco, 2017). Zesco has only recently run into acute difficulties and it is far from clear that private energy generation in dollar denominated PPAs will help in the long-term. Rather, Zesco needs to reduce its exposure to currency risk.

Second, the market paradigm is deeply embedded and has gained traction in the wake of the hydro crisis. The model is portrayed as a technocratic, politically neutral solution to the intrigue of patronage politics. However, the above discussion indicates that some of the core elements of the standard electricity reform model are not so clear-cut when located in the context of the wider system. The standard paradigm elements of state "inefficiency" caused by "under-pricing" needs to be unpicked to determine who pays what, and to whom, and for what to fully appreciate the equity implications. Closer inspection reveals numerous inconsistencies, contradictions and biases.

For example, the reform paradigm is strongly supportive of rent extraction in the form of returns to capital via interest and dividend payments. However returns to labour are strongly condemned as inefficient. Similarly, subsidies to Zesco, which have only emerged recently, are considered unaffordable. However, subsidies to capital, such as tax exemptions and risk guarantees, are encouraged. When it comes to the liabilities resulting from IPPs, the IMF is tolerant and even encouraging. Indeed, the move to cost reflective tariffs is aimed at attracting investment into the sector to boost generation capacity (IMF, 2017). Yet outside the energy sector, Zambia has rapidly shifted to a situation of high risk of debt distress amid concerns about the fiscal effects of government borrowing. The treatment of risk is similarly biased. The neoliberal policy framework requires generation projects to be "de-risked" in order to create projects that are attractive to investors. But this risk is passed to the state. Under the Scaling Solar projects, Zesco faces demand risk, currency risk, and the risk of stranded assets

if technological change means that the solar plants become obsolete.

Some elements of the SoP discussed above might be considered to be outside the donor-led reform package. The World Bank cautions against unplanned and unsolicited proposals from investors. It is likely that the expensive IPPs in Ndola and Maamba may fall into these categories. But these but these are not anomalies when located within a global narrative that is heavily promoting private investment to achieve the SDGs. Countries in crisis are likely to be drawn to opportunistic deals and the global narrative is strongly supportive, for example with the high praise for the Maamba financing deal. Despite global initiatives to divest from fossil fuels, Zambia's output from non-renewable sources is expanding rapidly (ERB, 2018), ironically in the wake of a climate change-induced break in renewable supplies. While non-hydro capacity expansion is required, some kind of flexible back-up facility would better suit development objectives. But the policy space is dominated by a heavy promotion of private provision and persistent denigration of the state.

When set in the context of the wider SoP, the pressure for a cost recovery tariff raises distributional concerns. Zambian households are paying to offshore investors, which include the world's richest, via their consumption of electricity. Arguably an increase in residential tariffs to finance such returns to shareholders via these contracts will have a regressive impact at the global level. Meanwhile, rural access has not improved. The Rural Electrification Fund, developed to expand electricity access, receives funding from government and donor grants as well as a three percent levy on all retail electricity bills to non-mining customers, (World Bank, 2017b). Note that the mining sector does not contribute to this fund, according to publicly available information sources. However, the REA is hopelessly underfunded. The Authority has been spending about \$15 m annually on rural electrification compared with an annual funding requirement of \$50 m (Malambo, 2018). Government electrification targets of 90% for urban and 51% for rural areas by 2030 are unlikely to be achieved⁷ (World Bank, 2017b). There is a sense of fiscal shortages, but funds are available elsewhere in the sector. As mentioned, the Ndola IPP made a post tax profit of over US\$41 m in 2018, funded by payments from Zesco. CEC paid dividends to its offshore owners an average of US\$20 m each year over the past five years.

The relative wealth of the mining sector could be more transparently integrated. The mines tend to sit separately from the rest of the economy within the electricity sector and from the communities in which they operate. Mineral revenues in Zambia are not shared with the local governments of communities where minerals are extracted. Any positive contributions are ad hoc and inconsistent (WBG, 2016). Kesselring (2017) uses detailed ethnographic research in the mining towns of Solwezi and Kalumbila in North-Western Province to highlight the effects of the preferential treatment of the mining sector during the electricity crisis, which was the last to be affected by load-shedding. The expat workers in the protected enclaves of the mines had almost unlimited access to electricity while the rest of the town struggled to provide basic services.

Subsidised electricity prices are heavily criticised by the IFIs because they benefit the wealthy. However, arguably, there is much about the current and proposed structure that is regressive, on which IFIs are largely silent. Cost-reflective tariffs are promoted on the grounds that a subsidy is inequitable as only the wealthy have access to electricity. But the payment of high returns to off-

shore investors in IPPs from Zambian households raises a different set of equity issues. Furthermore, taken to its logical conclusion, a cost-reflective tariff in Zambia, in the absence of some form of welfare subsidy, would mean that the mining sector pays the lowest tariff and households in remote rural areas the highest, as mining customers are cheapest to serve. It is therefore unsurprising that the mining sector welcomes cost-reflective tariffs.

Overall, the matrix of cost recovery is more complex than it is currently framed. Account must be taken of macroeconomic factors such as adverse exchange rate movements which result from the broader dynamics of the macroeconomy as opposed to narrow efficiency concerns at the level of the public utility. Renewable energy generation is widely regarded as a niche for the international private sector. Global capital is on the lookout for investment opportunities given the very low levels interest rates and is an ally of the development community in constructing infrastructure as an asset class.

6. Conclusion

The electricity sector policy paradigm in Zambia, as in many developing countries, is organised around a standard set of narratives: the state utility is inefficient, there is a need for more generation capacity, particularly in solar energy, which needs to come from the private sector, and tariffs need to be increased to make the sector commercially viable. In contrast to the patronage politics of the state bureaucracy, these market interventions are deemed apolitical. However, the SoP approach lifts the lid on these superficial interpretations to unpack the ways that the agents in the sector interact to demonstrate that this framing is not neutral but rather incorporates inherent biases. When the focus of political economy moves out from domestic politics to the global arena, a different set of power relations emerges. There is an inevitable and profound tension between the so-called "unlocking" of private-sector finance (McKinsey, 2019) for developing country infrastructure and the demands this imposes on the state in terms of de-risking as well as the low levels of domestic affordability in the lower income context (Osiole et al., 2017). As elsewhere, the headlines of energy transitions obscures the underlying structures, led by investors and donors. The narrative of market models promotes a specific agenda and presents a new kind of distributional politics (Newell and Phillips, 2016).

Our analysis indicates that the paradigm policies are ill suited to the specific challenges that Zambia faces. The continuing financial crisis facing Zesco is in large part due to payments to foreign-owned IPPs at a price below the commercial tariff (Zesco, 2017). A policy of raising tariffs to put an end to such subsidies as advocated by the IMF does not remove the problem. But, increasing Zesco's liabilities with commitments to long-term, dollar-denominated PPAs, for private electricity is likely to worsen Zesco's financial situation in the long-term. Moreover, our analysis indicates that most of the nation is not able to afford a tariff that covers costs. The situation appears intractable for Zesco. There are, however, there are some clear winners. It is difficult to avoid the conclusion that international private capital has been the main beneficiary of developments in Zambia's energy sector, from investors in IPPs, to the owners of CEC. Social outcomes in terms of increased access have been negligible, yet the funds required for universal access are small compared with returns to investors.

Our findings raise major concerns regarding pressures for the private sector to fill the infrastructure financing gap (McKinsey, 2019; World Bank and IMF, 2017; Mawdsley, 2018). The financing gap can only be plugged by public or donor funds or by user fees. The private sector does not fill the gap in the long term. It may be that IPPs bring advantages over public investment, such as

⁷ Note, however, that the definition of access is expected to change in light of technological developments, possibly taking the form of a solar panel for a hand-held device such as mobile phone or lighting appliance for a remote household which will require revision of the rural electrification approach (World Bank 2017b).

speed and cost of construction, or predictability of financial flows, but providing funding is not one of them. The IPP is effectively a financial and operational intermediary, and one which often comes at high costs and with inflexible terms requiring extensive government and donor resources in order to de-risk investments (Gabor, 2020).

The construction of infrastructure deficiencies in terms of investment opportunities for wealthy institutional investors without regard to the structural conditions and causes of underdevelopment will contribute to existing patterns of global inequality (Mawdsley, 2018; Liverman, 2018). Scholars point out that the classical dependency – periphery theory still holds today with economic growth in SSA concentrated in extractive sectors where profits are quickly repatriated. Recent high growth rates have failed to improve the quality of life for the majority of citizens (Khisa, 2019; Amin, 2014; Taylor, 2016). Energy sector policies organised around the entry of global capital are likely to contribute to this dynamic of unequal global capital accumulation. Domestic financial resources and public funds for investment in generation should be prioritised.

The documented failings of the paradigm offer a welcome platform for a revised approach to energy sector reform. Foster and Rana (2020, p.36), for example, advocate greater pluralism. But this needs to be accompanied by a re-evaluation of the core assumptions that feed the prevailing narratives. Rather than an off-the-peg policy package, attention is needed to the specific constraints and opportunities that Zambia faces, and to reflect the genuine challenges in providing a widely available energy source. Moreover, these need to be located within a reconstruction of the prevailing neoliberal discourse, one where equitable and sustainable development are prioritised rather than economic growth and productive efficiency.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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